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THE THEORY OF THE PARASITIC ORIGIN OF PELLAGRA.

By C. H. LAVINDER, Passed Assistant Surgeon, United States Public Health and Marine-Hospital Service.

My experience and observations regarding pellagra in Italy have thus far served to make evident one fact. While of course the great majority of the Italian medical world hold the view that there is some important, if not well understood, etiological relation between pellagra and the use of spoiled corn as an article of diet, there are nevertheless at least some students of the disease who have begun seriously to question such an etiological relation. And this has resulted, it seems to me, in a perceptible tendency, more or less strong among certain students of pellagra, to disregard corn entirely as an etiological factor in this disease and to seek some new idea to explain its occurrence. This tendency is in the direction of some protozoal or animal parasite and has been, in all likelihood, produced and stimulated by the ideas of Sambon, first expressed in 1905 at the meeting of the British Medical Association, when he stated that he believed the disease to be caused by a protozoal parasite, probably transmitted by some blood-sucking insect.

Recently there has been formed, as announced in the medical press, a British commission for the study of pellagra, and Sambon has been sent to Italy to try to establish his views on the etiology of the disease.

Sambon's theory has been worked out much more in detail than when first presented, in 1905, and has attracted much serious attention. I have learned personally from him that so far his work in Italy, largely of an epidemiological nature, has greatly strengthened him in his belief in the accuracy of his theory and that he feels confident of its ultimate proof.

SAMBON'S THEORY.

Succinctly expressed, this theory in its main features is as follows, the details having been kindly furnished me by Doctor Sambon:

Pellagra is not due to maize, either good or bad, because—

1. It is found in places where maize is neither cultivated nor eaten.
2. It is absent from many places where maize is the staple food of the population.
3. It has in many places either decreased or become more prevalent without any change in the food of the people.
4. Its constant and peculiar distribution does not agree with the very irregular and ever-changing distribution of spoiled maize.

5. In over a century and a half, since the maize theory was first suggested, no one has been able to prove it.

The belief that the disease has everywhere followed the introduction of corn cultivation is unfounded. Pellagra was first recognized as a specific disease in the beginning of the eighteenth century, but this does not prove that it was not prevalent long before that time.

Pellagra is a parasitic disease because:

1. For years the person affected may present some seasonal recurrences, which can only be explained by a parasitic agent with alternating periods of activity and latency.
2. It shows a constant and characteristic topographic distribution.
3. It shows a definite seasonal incidence.
4. Its symptoms, course, duration, morbid anatomy, as well as its therapy, are similar to those of parasitic diseases.
5. Of two places, almost contiguous, one may be affected, the other not.

Pellagra is an insect-borne disease because:

1. It is limited, like malaria, sleeping sickness, etc., to rural places and more especially to the vicinity of certain water bodies.
2. It has a definite seasonal incidence—spring and autumn.
3. It affects, to a large extent, a certain class of people—the field laborers.
4. It is not contagious and neither food nor water can account for its peculiar epidemiology.
5. Within its endemic centers it affects all ages and frequently whole families.
6. Outside its endemic centers only adults who have visited the infection areas present the disease and frequently only one or two members in a family are affected.

Pellagra is conveyed by *Simulium reptans* because:

1. *Simulium* is found in the torrents and swift running streams of all pellagra districts.
2. *Simulium* has the peculiar seasonal distribution of pellagra (spring and autumn).
3. *Simulium* is found only in rural districts. It is unknown in towns and villages. It does not enter houses.
4. *Simulium* explains most admirably the peculiar limitation of the disease to field laborers.
5. *Simulium* is the only blood-sucking insect which the British field commission has found in its visits to numerous pellagrous districts in Italy.
6. *Simulium reptans*, like *Anopheles maculipennis*, has a world-wide distribution and explains the wide distribution of pellagra. It is found wherever pellagra is found.
7. *Simulium* causes epizootics in animals in America and in Europe.
8. Professor Mesnil has found a protozoal organism in *simulium*.

ATTITUDE IN AMERICA.

The judicial mental attitude which American investigators have so far shown with regard to the etiology of pellagra is certainly to be commended in the present unsatisfactory status of this question. The etiology of pellagra is still an open question. The belief that the disease bears some relation to spoiled corn has so dominated the etiological field and has received the support of so many men of wide experience that it can not be now entirely disregarded; but certainly it need not be accepted with so complete a dogmatism as to prevent investigation along other suggestive lines.

The theory of Sambon has interested me greatly, and it seems that now, when this theory has been elaborated so much more in detail, it is well worthy of serious attention at the hands of American students and investigators.

FLEAS COLLECTED FROM SQUIRRELS FROM VARIOUS PARTS OF CALIFORNIA.

By George W. McCoy, Passed Assistant Surgeon, and Maurice B. Mitzmain, Assistant, Plague Laboratory, United States Public Health and Marine-Hospital Service.

During the past few months ground squirrels (*Citellus beecheyi*) have been received at the plague laboratory at San Francisco from 17 counties in California. The majority of these squirrels had been shot by the employees of the service, but a few had been trapped and sent in alive. As the majority of fleas desert the host when the body becomes cold after death, comparatively few fleas were present upon the dead hosts. The examination of the squirrels for fleas is a matter requiring so much time and labor that only a small number of the rodents were combed.

The only host considered here is the California ground squirrel (*Citellus beecheyi*), but some of the squirrels were members of two varieties ([a]) of the species, *Citellus beecheyi douglasi* from Solano County, and *Citellus beecheyi fisheri* from some of the southern counties. These varieties differ chiefly from the type species *Citellus beecheyi* in the color markings of the pelage.

We would call attention to the fact that *Argopsylla gallinacea* (Westw.) End. is here reported for the first time from the California ground squirrel. This flea, which occurs rarely on the rat in California, is the normal parasite of the domestic fowl. It is fair to assume that the squirrels from which these fleas were removed were associated directly or remotely with chicken yards. The *A. gallinacea* was found on several of the squirrels in great numbers, and strange to say, was always found on the head, especially in the region of the mouth and eyes.

We take occasion also to call attention to the presence of *Ctenopsyllus musculi* (Duges) Wag. on the ground squirrel. This is the blind flea of the mouse and rat. It has heretofore been recorded from the squirrel under conditions of experimental transference from rats to squirrels, but we have here the first record of the occurrence of *Ct. musculi* in nature. It was obtained from two counties.

Hoplopsyllus affinis Baker and *Spilopsyllus inaæqualis* Baker are rabbit fleas and their accidental presence on ground squirrels is easily accounted for.

It will be noted that *Ceratophyllus acutus* Baker predominates on the squirrels from every county. It has been previously shown, experimentally, that this flea is capable of transferring plague from one squirrel to another.

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[a] We are indebted to Prof. Joseph Grinnell, of the Department of Mammalogy of the University of California, at Berkeley, for the identification of these varieties.